

# TPS Failure Modes and Margins, and Architectural Concepts to Maximize Entry Reliability

Completed Technology Project (2017 - 2018)



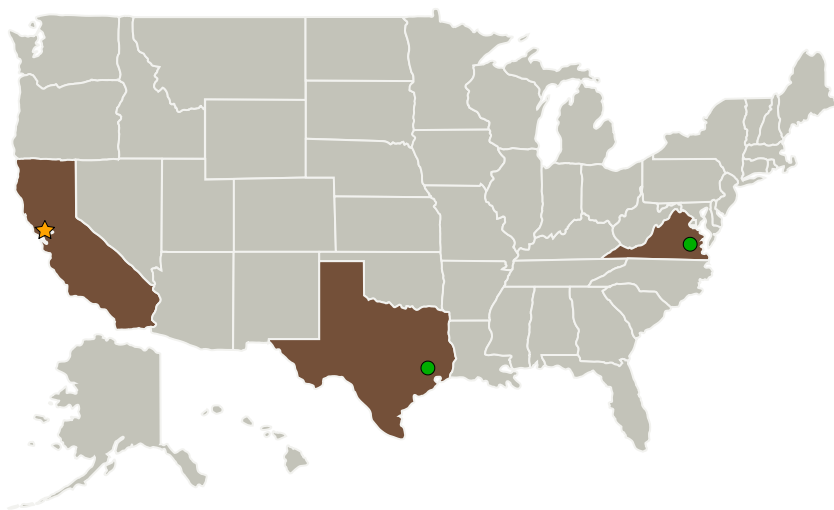
## Project Introduction

This study will generate data to be used in a Risk Informed Decision Making (RIDM) framework that will evaluate the current MSR EEV baseline aeroshell TPS material, and potential 3D woven TPS alternatives. The RIDM process and other key metrics will guide the ranking and selection between potential architectures and identify opportunities for design improvements that promote system reliability.

## Anticipated Benefits

Reliability requirements for a Mars Sample Return (MSR) mission are several orders of magnitude more stringent than any mission flown to date. This requirement drove the current MSR design to a fully dense Carbon Phenolic TPS; however, recent advances in 3D Woven TPS technologies merit a re-opening of this design trade to achieve the highest system reliability possible. We will generate data to be used in a RIDM framework, evaluate current MSR EEV TPS and alternatives within the RIDM framework, rank & recommend a TPS solution, and develop a risk retirement strategy for the recommended TPS solution.

## Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
★ Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
● Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia
Neerim Corporation	Supporting Organization	Industry	Mountain View, California

## Primary U.S. Work Locations

California	Texas
Virginia	

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Center / Facility:

Ames Research Center (ARC)

### Responsible Program:

Center Innovation Fund: ARC CIF

## Project Management

### Program Director:

Michael R Lapointe

### Program Manager:

Harry Partridge

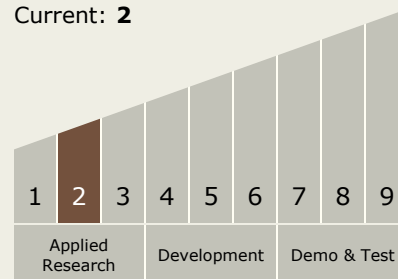
### Principal Investigator:

Margaret M Stackpoole

## Technology Maturity (TRL)

Start: 2

Current: 2



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## Technology Areas

### Primary:

- TX09 Entry, Descent, and Landing
  - └ TX09.4 Vehicle Systems
    - └ TX09.4.5 Modeling and Simulation for EDL

## Target Destinations

Earth, Mars